

Nivel “Libres”
Problem Set

1 de Noviembre de 2019

Problem A: Rangel and the array game II

https://www.urionlinejudge.com.br/judge/es/problems/view/2849

Author: Diego Rangel, Brasil. - Timelimit 3

Always after the programming competitions the participants usually interact. Thinking about it, Rangel is developing an interesting game for the participants to play after a competition. This game will be known as the Array Game.

The Array Game works as follows:

- A array with N integers is generated randomly and shown for 10 seconds for the challengers.
- Then follows Q rounds where players must say how many times the Kth smaller element appears in a given range.
- Win the round closest to the result.

This year Rangel called his friends Gugu and Dabriel to test the new game and asked you to design the judge to say who Kth is their frequency in the break and who wins the ith round.

Input

In the first line consists of two integers N and Q ($1 \leq N, Q \leq 10^5$) representing the size of the array. The next line contains N integers Xi ($-2^{32}+1 \leq Xi \leq 2^{32}-1$) which are the elements of the array. The next Q lines contain five integers L and R ($1 \leq L \leq R \leq N$) representing the extremes of the round interval, K which is the smaller Kth element drawn (Kth will always exist), G and D ($1 \leq G, D \leq 2^{32}-1$) the guess of Gugu and Dabriel respectively.

Output

For each round you should print an integer X that is the smallest Kth, an integer Y that indicates how many times the smallest Kth appears in the range and a character C that should be:

- G case Gugu wins; - D case Dabriel wins; - case of a draw.

Examples

Input	Output
10 5 1 4 5 2 7 4 5 8 10 1 1 10 1 3 1 1 5 2 1 4 2 6 3 1 1 7 7 1 0 10 3 8 4 10 4	1 2 E 2 1 G 4 2 E 5 1 G 5 2 D

Problem B: Palindrome

https://www.urionlinejudge.com.br/judge/es/problems/view/2795

Author: Luciano Ribeiro, Brasil. - Timelimit 1

"Eva usaba rimel y le miraba suave" (Juan Filloy)

Given a string of characters *S* , you were given the challenge of turning it into a palindrome. A palindrome is a text that is exactly the same if read from right to left as well as from left to right. For example, *racecar* and *radar* are palindromes.

To transform a text into a palindrome, you can choose a position *i* in the text and replace the letter in this position with any other letter. This operation has a cost that is the distance between the letter of the alphabet that was before and the one that you chose. Note that the alphabet is circular, so you can substitute *a* for *z* with cost *1*. You can apply this same operation as many times as you want, each time adding the cost as described.

Because sometimes you need many modifications to transform an entire string into a palindrome, you have been allowed to divide the original string into up to *K* contiguous segments, so that after each modification, each of those segments is a palindrome. This division has no cost. The total cost of the transformation you made will be the sum of the costs of the operations performed on each segment. What is the lowest possible cost for turning all segments into palindromes?

Input

The entry begins with a line containing two integers *S* and *K* (1≤K≤N≤400) separated by space. The second line contains a string *S* with *N* characters formed only by lower case letters of the alphabet, from *a* to *z*.

Output

Write in the output a line containing an integer: the least cost to transform *S* into a palindrome, given you can partition it into up to *K* contiguous segments.

Examples

Input	Output
4 1 abxa	4
4 1 aabz	2

4 2 aabb	0

Problem C: Gabriel and the divisibility

https://www.urionlinejudge.com.br/judge/es/problems/view/2946

Author: Luciano Ribeiro, Brasil. - Timelimit 1

Dabriel loves to play with numbers and this time has a very interesting game. It has a binary number **N** and a list with **M** numbers and you want to know for which numbers $\mathbf{M}_i$ from that list **N** is divisible.

This task is very easy for him, so you will not waste time doing this, can you help him?

Input

The first line contains a number in binary **N** ($1 \leq |\mathbf{N}| \leq 10^5$). In the second line contains an integer **M** ($1 \leq \mathbf{M} \leq 10$), which represents how many numbers one wants to know the divisibility. In the next **M** lines, it will have an integer $\mathbf{M}_i$ ($1 \leq \mathbf{M}_i \leq 10^5$), where $\mathbf{M}_i$ is the number Dabriel wants to know if it divides **N**.

Output

Print out all the numbers that divide **N** from the list given by Dabriel (as he is a little inattentive there may be duplicates in his list, so print out all), separated by a space, ordered in ascending order. If no number exists, print: "Nenhum", without quotation marks.

Examples

Input	Output
10 5 1 4 5 2 7 4 5 8 10 1 1 10 1 3 1 1 5 2 1 4 2 6 3 1 1 7 7 1 0 10 3 8 4 10 4	1 2 E 2 1 G 4 2 E 5 1 G 5 2 D

Problem D: How much Cassava ?

https://www.urionlinejudge.com.br/judge/es/problems/view/2936

Author: Felipe C. Ochial, Brasil. - Timelimit 1

Every year in April, the Curupira, Boitatá, the pink Boto (this one in his man form, as Dona Chica likes it better), Mapinguari and Iara meet at Dona Chica to remember their moments with Mani, the beautiful girl with the white skin. And as it could not be different the main dish of this meeting is the cassava. Each one of them eats one to ten servings of cassava and they always warn Dona. Chica in advance about how many servings they will eat that day. The size of the portion of each is different, but they are always the same. The portions are as follows (in grams):

- Curupira eats 300
- Boitatá eats 1500
- Boto eats 600
- Mapinguari eats 1000
- Iara eats 150

Dona chica in turn always eats 225 grams of cassava. Tired of every year having to figure out how much cassava to prepare she contacted you to write a program that tells how much cassava should be prepared in grams.

Input

The input consists of 5 integers each representing the portions that the guests of Dona Chica will consume. The first integer represents the portions of Curupira, the second of Boitatá, the third of Boto, the fourth of Mapinguari and the fifth of Iara.

Output

The output consists of a single integer representing how much cassava Dona Chica should prepare in grams. Do not forget the line break after the answer :).

Examples

Input	Output
1 1 1 1 1	3775
2 2 2 2	7325

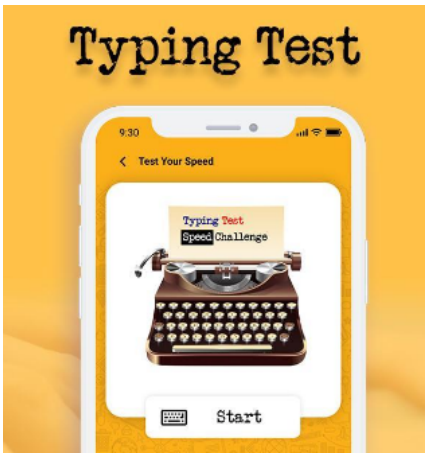
2	

Problem E: Fast writing, the competition

https://www.urionlinejudge.com.br/judge/es/problems/view/2844

Author: Gustavo Policarpo, Brasil. - Timelimit 1

Matheus and his twin brother Vinicius have decided to expand their tying duel to a major competition in which key players from many parts of the world take part.



The competition takes place in several phases and in each one the participants are placed in a row ordered by their respective indexes and the ith participant will duel with the ith + 1, and the winner advances to the next phase. In case of a tie, the lowest index participant passes. He is declared winner of a duel, the one that can enter a certain phrase faster, that is, the one that obtains the less time resulting from its reaction time added to the time necessary to enter the phrase of that round. In each phase also, the text used will be the previous one concatenated with itself.

Given each competitor's information, please tell us which stage each will reach.

Input

The first line of the entry consists of an integer **N** representing the number of participants. The next **N** lines consist of two integers **Ri** and **Ei** representing the reaction time and the writing time, that is, the time it takes to type each character regardless of which is, in milliseconds of the i-th participant. The last line consists of the text **S** used in the first phase of the competition. It is guaranteed that following the rules of the competition all phases will be an even number of participants, except for the last, and that the text **S** contains only alphanumeric characters, punctuation marks and spaces.

1 ≤ N ≤ 65536

1 ≤ Ri, Ei ≤ 1000

1 ≤ |S| ≤ 100000

Output

The output should be a line containing the phase number in which each participant arrives.

Examples

Entrada	Salida
4 4 1 3 1 2 1 1 1 ABCD	1 2 1 3
2 5 2 23 1 leibe do biruleibe	2 1

In the first example: In phase 1 the first participant hurts with the second, and the third with the fourth on the text ABCD. Each participant takes, respectively, 8, 7, 6, 5 milliseconds to complete the challenge, advancing then the second and fourth participant. In phase 2, we have the duel of the second and fourth participant, ABCDABCD text, which they spend respectively 11 and 9 milliseconds, advancing the fourth participant.

Problem F: Emergency in Manaus

https://www.urionlinejudge.com.br/judge/es/problems/view/2944

Author: Diego Rangel, Brasil. - Timelimit 1

In the city of Manaus there is an important industrial center that contains a great variety of companies from different sectors. This region is known as the Manaus Free Trade Zone.
In order to facilitate the flow of raw materials from the city to the industrial pole, the Manaus government has built several roads that connect the companies to each other. Due to the sudden large volume of rainfall, several of the roads built by the government were flooded, thus generating slowness in the distribution of the raw material.

The government of Manaus together with the State Council of Traffic Engineering of Amazonas, developed a solution, in the short term, in order to not completely freeze the Free Trade Zone. This measure consists of building some emergency roads and keeping all factories connected even though indirectly, but different from the previous configuration, the new system will have the following restrictions:

- All roads can now only be used in one direction, hoping to use the other lane to increase the flow;
- All trucks will arrive by a single company **S** and will be distributed to other companies from the roads starting from **S**.

The government needs to be agile as each day costs millions, so they count on you to determine the minimum amount of roads that need to be built in order that all other businesses can be reached from the company **S**.

Input

The entry consists of a single test case. The first line is composed of three integers **V** ($1 \leq \mathbf{V} \leq 2 \times 10^4$), **E** ($0 \leq \mathbf{E} \leq 2 \times 10^5$), **S** ($1 \leq \mathbf{S} \leq \mathbf{V}$), the number of companies in the Manaus Free Trade Zone, the number of non-flooded roads and the company that will be the center of the distribution operation respectively.

Follow then **E** lines, each with two integers **X** and **Y** ($1 \leq \mathbf{X},\mathbf{Y} \leq \mathbf{V}$) that indicate that there is a road that connects company **X** to company **Y**.

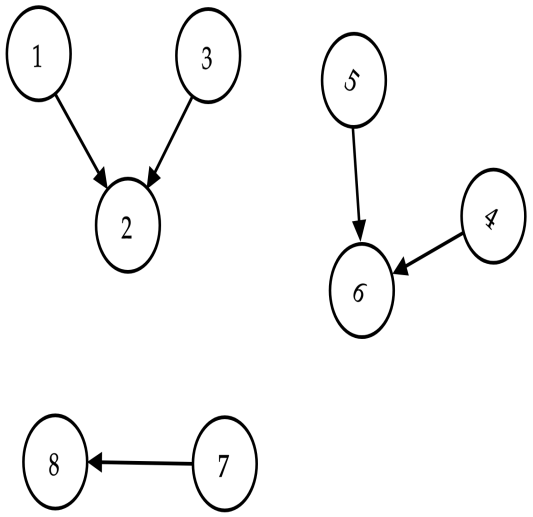
Output

You must print an integer that represents the minimum number of roads to be built by the government.

Examples

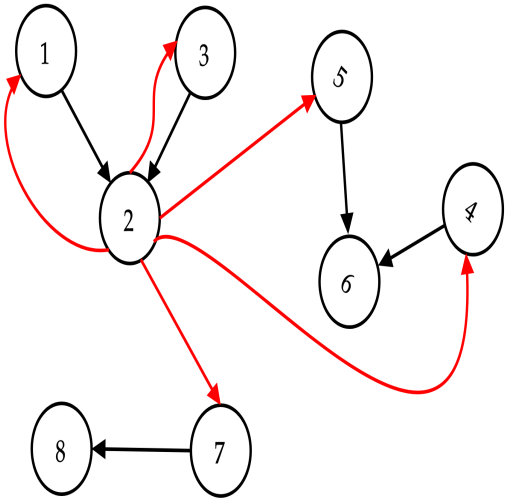
Input	Output
8 5 2 1 2 3 2 5 6 7 8 4 6	5

Explanation of the test case



For S=2

A possible optimal solution is to create the following roads: (2,7),(2,5),(2,4),(2,1),(2,3). As shown in the figure below.



Answer: 5

Problem G: Dices

https://www.urionlinejudge.com.br/judge/es/problems/view/2790

Author: Luciano Ribeiro, Brasil. - Timelimit 1

After long Dungeons & Dragons matches, Alice and her friends decided to do something else. Since Alice is very organized, at the time of saving the dice she would like to leave all the dices with the same value face up. But since she's also lazy, I'd like to do this with as few moves as possible.



With each move, it can rotate the dice to show one of the adjacent faces of the current face. Note that in this version of the game, Alice and her friends are using regular, six-sided dices, numbered 1 to 6, where the sum of two opposite faces always results in 7.

Help Alice determine the least amount of movement required so that all the dices faces the same side up.

Input

The entrance is composed of two lines. In the first one we have an integer **N**, indicating the amount of dices. The second line contains **N** integers separated by space. The i-th of them, $\mathbf{d}_i$, represents the face value that faces up.

$1 \leq \mathbf{N} \leq 10^5$

$1 \leq \mathbf{d}_i \leq 6$, for all $1 \leq i \leq \mathbf{N}$

Output

Display an integer in a row, the least amount of movement required to leave all the dices the same face up.

Examples

Input	Output
3 2 2 2	0
7 5 1 6 1 1 1 6	5

Problem H: Balloon++

https://www.urionlinejudge.com.br/judge/es/problems/view/2840

Author: Diego Rangel, Brasil. - Timelimit 1

In a country called “1Dólar==1Peso” there is an old programming contest where nobody gets prizes and nobody put on a costume!, in that contest, teams that solve a problem gets a balloon.

For you who are beginner and do not leave the room without any balloon here is a challenge for you:



- This year the balloons have a spherical shape, according to the company that produces the balloons: "... for complex engineering reasons, this format is better (...)" will understand ...
- However this format makes the balloon use more helium gas and this caused a problem because the organizer had already bought a tank with **L** liters of gas before this novelty in the balloon market.

Knowing the radius of the balloon model and the amount of helium gas available, could you help the team by saying how many balloons can be filled completely?

Input

The input is composed of two integers **R** and **L** ($1 \leq \mathbf{R}, \mathbf{L} \leq 10^9$) the radius and the amount of gas available respectively.

Consider PI = 3.1415

Output

You must print a single integer representing the amount of balloons that can be filled with the amount of helium gas available.

Examples

Input	Output
4 4000	14
2 50	1

Diego says: $v = (4/3) * (\pi * r^3)$

Problem I: Party at the North Pole

https://www.urionlinejudge.com.br/judge/es/problems/view/2845

Author: Francisco Elio Parente Arcos Filho, Brasil. - Timelimit 1

Giovana was very happy to be able to send her letter to Santa and receive great gifts. The joy was so great that she resolved to invite all the leprechauns of the good old man to his birthday party that is shortly after Christmas in January. However, she does not want the Grinch to show up at her party to ruin everything so she made a plan.



To hide from the evil Grinch where the party will be, she decided to use the leprechauns' meeting system that works like this: Each leprechauns has a unique numeric identifier and when there is going to be a meeting the house of one of the leprechauns is chosen to host the meeting, but Instead of writing the number of the host leprechaun on the mural of Santa's factory, where everyone can see, it is written the identifier of exactly all the leprechauns with numbers smaller than his and that are coprime to his. This method is also a way of saying that these mural leprechauns must bring food and drinks to the meeting.

Since the Grinch is so bad with numbers to the point of not knowing that two numbers are only called coprimes if the GCD (greatest common divisor) between them is 1, Giovana simply sends a letter to the north pole with the numbers of the leprechauns that must take the food and with that the leprechauns can already figure out where the birthday party will be but the Grinch do not.

Given the letter that the leprechauns received, determine in the house of which leprechaun will be Giovana's birthday party.

Input

The first line of the entry contains an integer **N** ($1 \leq \mathbf{N} \leq 10^4$) which represents the number of numbers written in Giovana's letter. The second line of the entry has **N** integers $\mathbf{A_i}$ ($1 \leq \mathbf{A_i} \leq 10^5$) representing the identifiers of the leprechauns written in the letter.

Output

The output consists of a single line containing the number of the leprechaun that will host the party of Giovana in his house.

Examples

Input	Output
4 7 1 9 3	10

6 4 6 1 5 3 2	7
12 23 19 15 9 27 3 11 17 5 1 13 25	28

Problem J: Azaí Planting

https://www.urionlinejudge.com.br/judge/es/problems/view/2948

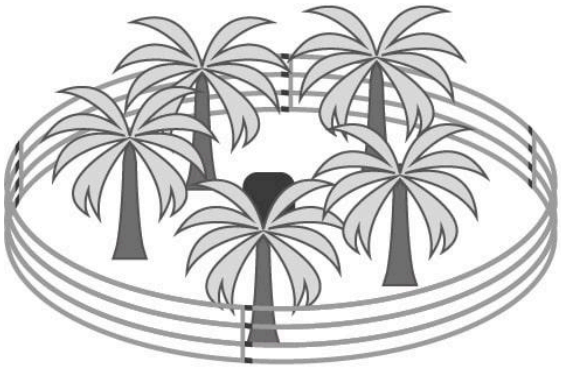
Author: Diego Rangel, Brasil. - Timelimit 1

Rangel is passionate about açaí and decided to buy an açaí producing farm in the north of the country. A few months after the purchase of this farm, its açaí plantations began to be looted, causing damage to the young farmer.

Rangel decided to hire a company to install an electrified fence in order to prevent looters from stealing the remaining açaí feet on his farm.

As the farm land is perfectly flat, the contracted company has recommended the following fence model:

- The fence will be circular;
- It will have 4 electrified wires in parallel;
- The battery is located in the center of the fence.





Rangel accepted the model, but requested that the fence be sufficient only to surround the remaining açaí feet, as he would have to spend on replacing the looted feet.

You are an employee of the company you hire and your boss asks you to perform the following task:

Knowing the location of each foot, you should determine the minimum fence that surrounds all remaining açai feet. That is, the coordinate of the battery, the radius of the fence and the amount of electrified wire needed following the model proposed by the company.

For this problem consider π=3.14

Input

The input is composed of a single test case.

The first line contains an integer **N** ($3 \leq \mathbf{N} \leq 10^5$) that indicates the amount of remaining açaí feet on the farm.

Then follows **N** lines, each line with two decimal numbers **X** and **Y** ($-10^4 \leq \mathbf{X},\mathbf{Y} \leq 10^4$) that indicate the coordinates of the i-th foot of açaí.

Output

You should print the coordinates of the center of the fence X_c and Y_c, the radius of the fence, and the amount of electrified wire needed to encircle all açaí feet (Use two decimal digits).

Examples

Input	Output
5 -1.00 -1.00 1.00 1.00 3.00 3.00 -1.00 3.00 3.00 -1.00	1.00 1.00 2.83 71.05

Problem K: Class

https://www.urionlinejudge.com.br/judge/es/problems/view/2788

Author: Gabriel Poesía, Brasil. - Timelimit 1

This year Rangel called his friends Gugu and Dabriel to test the new game and asked you to design the judge to say who Kth is their frequency in the break and who wins the ith round.

Input

In the first line consists of two integers N and Q ($1 \leq N, Q \leq 10^5$) representing the size of the array. The next line contains N integers Xi ($-2^{32}+1 \leq Xi \leq 2^{32}-1$) which are the elements of the array. The next Q lines contain five integers L and R ($1 \leq L \leq R \leq N$) representing the extremes of the round interval, K which is the smaller Kth element drawn (Kth will always exist), G and D ($1 \leq G, D \leq 2^{32}-1$) the guess of Gugu and Dabriel respectively.

Output

For each round you should print an integer X that is the smallest Kth, an integer Y that indicates how many times the smallest Kth appears in the range and a character C that should be:

- G case Gugu wins;
- D case Dabriel wins;
- E case of a draw.

Examples

Input	Output
10 5 1 4 5 2 7 4 5 8 10 1 1 10 1 3 1 1 5 2 1 4 2 6 3 1 1 7 7 1 0 10 3 8 4 10 4	1 2 E 2 1 G 4 2 E 5 1 G 5 2 D

Problem L: Bits Mixing

https://www.urionlinejudge.com.br/judge/es/problems/view/2942

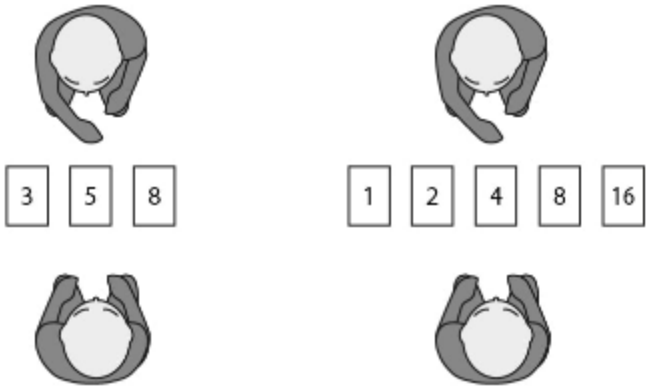
Author: Francisco Elio Parente Arcos Filho, Brasil. - Timelimit 1

"The world is divided into 10 classes of people,
those who know the binary system and those who do not"

Bit mixing is an operation performed on a position of an array of integers. When applied to position i of an array A, it mixes the bits of the number in position i with those of the adjacent positions of the array. In more exact terms:

$$A[i] \leftarrow A[i-1] \oplus A[i] \oplus A[i+1]$$

(read: $A[i]$ receive the xor of $A[i-1]$ with $A[i]$ with $A[i+1]$)



The operator ⊕ symbolizes the-xor bitwise operation.

By definition, the operation can only be applied on positions having both adjacent positions.

Your task is, given two configurations of an array, to calculate the minimum number of bits mixing to transform the first array into the second.

Input

The first line of the input consists of an integer **N** ($1 \le \mathbf{N} \le 10^5$) representing the size of the array. The second line of the input has **N** integers $\mathbf{A}_i$ ($0 \le \mathbf{A}_i < 2^{31}$) representing the initial array configuration. The third line of the input has **N** integers $\mathbf{B}_i$ ($0 \le \mathbf{B}_i < 2^{31}$) representing the final configuration of the array.

Output

The output consists of a single line containing the minimum number of operations to transform array A into array B or the message "IMPOSSIBLE" if it is not possible to do so.

Examples

Input	Output
3 3 5 8 3 14 8	1
5 1 2 4 8 16 1 7 31 28 16	3
6 1 2 3 4 5 6 1 5 4 3 2 6	IMPOSSIBLE